

CLAIMS

1. A chip comprising:

a substrate;

a sample introduction unit provided on said substrate;

5 a channel which is communicated with said sample introduction unit;

a separation unit which includes a part of said channel, and separates components in a liquid sample introduced in said sample introduction unit;

10 a pretreatment unit which is provided at upstream of said separation unit, and which applies predetermined pretreatment to said liquid sample introduced in said sample introduction unit; and

an analysis unit which analyzes said components separated at said separation unit.

2. The chip according to claim 1,

wherein said pretreatment unit includes a pretreatment reservoir, and a switch which is provided at downstream of said pretreatment reservoir, and which controls to supply said liquid sample from said pretreatment unit to said separation unit, and

said switch has a damming portion which dams up liquid in said pretreatment reservoir, and a trigger channel which is communicated with said channel at said

10 damming portion or downstream of said damming portion, and
which introduces said liquid to said damming portion.

3. The chip according to claim 2,
wherein said liquid sample includes insoluble
components, and said pretreatment reservoir has
solubilizing substance solubilizing said insoluble
5 components.

4. The chip according to any one of claims 1 to 3,
comprising a mixing unit which is communicated with said
separation unit and said analysis unit, and which
homogenizes a concentration of said components in a liquid
5 including said components separated at said separation unit.

5. A chip comprising:
a substrate;
a sample introduction unit which is provided on said
substrate;
5 a channel which is communicated with said sample
introduction unit;
a separation unit which includes a part of said
channel, and which separates components in a liquid sample
introduced in said sample introduction unit;
10 a mixing unit which is communicated with said
separation unit and an analysis unit, and which homogenizes
a concentration of said components in a liquid including

said components separated at said separation unit; and

said analysis unit which analyzes said components in
15 said liquid including said components homogenized at said
mixing unit.

6. The chip according to claim 4 or 5,

wherein said mixing unit has a structure in which one
region of said channel and other regions are communicated
with one another via micro channels.

7. The chip according to claim 4 or 5,

wherein said mixing unit includes a switch which is
provided at said channel, and which controls to supply said
liquid sample from said mixing unit to said analysis unit,

5 and

said switch has a damming portion which dams up
liquid in said channel, and a trigger channel which is
communicated with said channel at said damming portion or
an area of downstream side of said damming portion, and
10 which introduces said liquid to said damming portion.

8. The chip according to any one of claims 4 to 7,

wherein said mixing unit has a movement control unit
which controls a timing in which said liquid sample moves
to said analysis unit, and said movement control unit is
5 configured to introduce said liquid sample to said analysis
unit after retaining said liquid sample for a predetermined

time.

9. The chip according to claim 8,

wherein said movement control unit includes a switch which controls to supply said liquid sample from said mixing unit to said analysis unit, and

5 said switch has a damming portion which dams up liquid in said channel, and a trigger channel which is communicated with said channel at said damming portion or an area of downstream side of said damming portion, and which introduces said liquid to said damming portion.

10. The chip according to claim 9,

wherein said trigger channel includes a time-lag channel which delays a timing in which said liquid sample moves to said analysis unit by retaining said liquid sample.

11. The chip according to claim 9,

wherein a time-lag reservoir which delays a timing in which said liquid sample moves to said analysis unit by retaining said liquid sample is provided at said trigger
5 channel.

12. The chip according to any one of claims 1 to 11, comprising a reaction unit which makes said components separated at said separation unit cause a predetermined reaction.

13. A chip comprising:

a substrate;

a sample introduction unit provided on said substrate;

5 a channel which is communicated with said sample introduction unit;

a separation unit which includes a part of said channel, and which separates components in a liquid sample introduced in said sample introduction unit;

10 a reaction unit which makes said components separated at said separation unit cause a predetermined reaction; and

an analysis unit which analyzes said components separated at said separation unit.

14. The chip according to claim 12 or 13,

wherein said reaction unit includes a reaction reservoir and a switch which is provided at downstream of said reaction reservoir, and

5 said switch has a damming portion which dams up liquid in said reaction reservoir, and a trigger channel which is communicated with said channel at said damming portion or an area of downstream side of said damming portion, and which introduces said liquid to said damming
10 portion.

15. The chip according to claim 14, comprising a reacting

substance which affects said components in said liquid sample, in said reaction reservoir.

16. The chip according to claim any one of claims 1 to 15, comprising a seal which covers a surface of the substrate.

17. The chip according to claim 16,
wherein an inert gas is filled in a space formed by said substrate and said seal.

18. The chip according to claim 16,
wherein a pressure is reduced in said space formed by said substrate and said seal.

19. The chip according to any one of claims 1 to 18,
wherein said surface of said substrate is made of a hydrophilic resin.

20. The chip according to any one of claims 1 to 19,
wherein said separation unit includes a switch which moves said liquid sample introduced in said sample introduction unit to said channel at a predetermined timing.

21. The chip according to any one of claims 1 to 20,
wherein said separation unit has a plurality of columnar bodies provided in said channel.

22. The chip according to any one of claims 1 to 20,
wherein said separation unit has a plurality of
concave portions provided in said channel.
23. The chip according to any one of claims 1 to 20,
wherein surfaces of said channel which structure said
separation unit has a plurality of first regions disposed
so as to be spaced, and a second region occupying the
5 surface of said separation unit other than said first
regions, and
between said first regions and said second region,
one is a hydrophobic region, and the other one is a
hydrophilic region.
24. The chip according to any one of claims 1 to 20,
wherein said separation unit has sample adsorbing
particles which develop said liquid sample in accordance
with a specific property.
25. The chip according to any one of claims 1 to 20,
wherein a bank unit is provided along a traveling
direction of said channel so as to divide said channel on
the bottom face of said channel structuring said separation
5 unit, and a height of said bank unit is lower than a depth
of said channel.
26. The chip according to any one of claims 1 to 20,

comprising

a cover which covers the separation unit,

wherein on a plane at said substrate side among the
5 planes of said cover, a bank unit is provided so as to
divide said channel along the traveling direction of said
channel, and

a height of said bank unit is lower than a depth of
said channel.

27. The chip according to claim 26,

wherein said bank unit is a resin film formed on the
plane at said substrate side of said cover.

28. The chip according to any one of claims 1 to 20,

wherein said separation unit includes a first channel
forming a part of said channel, a second channel through
which a liquid including specific components separated from
5 said liquid sample passing through said channel passes, and
a separation channel which makes said first channel and
said second channel be communicated with one another, and
through which only specific components are made to pass.

29. The chip according to any one of claims 1 to 28,

wherein said analysis unit has a plurality of
reservoirs into which said components are sorted.

30. The chip according to claim 29, comprising air holes

at said reservoirs or in the vicinity of said reservoirs of said channel communicated with said reservoirs.

31. The chip according to claim 30,
wherein a surface at a periphery of said air holes are made hydrophobic.

32. The chip according to any one of claims 1 to 31,
wherein said analysis unit has a detection unit which detects said components.

33. The chip according to claim 32, further comprising a covering member which covers said detection unit,
wherein said covering member and a micro lens are integrally formed.

34. The chip according to any one of claims 1 to 33,
comprising a waste reservoir communicated with said channel at downstream side of said analysis unit,
wherein said liquid in said channel is configured to
5 move toward a downstream side of said channel accompanying a movement of said liquid to said waste reservoir.

35. The chip according to claim 34,
wherein a liquid retaining portion is provided at said waste reservoir.

36. The chip according to claim 34 or 35, comprising air holes at said waste reservoir or in the vicinity of said waste reservoir of said channel communicated with said waste reservoir.

37. The chip according to claim 36,
wherein said surface at the periphery of said air holes is made hydrophobic.

38. The chip according to any one of claims 29 to 37,
wherein said channel has a branched portion, and said branched portion is communicated with said plurality of reservoirs.

39. The chip according to any one of claims 1 to 38,
wherein said liquid sample is configured to move in said channel by a capillary phenomenon.

40. The chip according to any one of claims 1 to 39,
wherein said separation unit has particles condensating by being specifically adsorbed to predetermined components in said liquid sample.

41. The chip according to claim 40,
wherein said separation unit includes a particle retaining reservoir retaining said particles, and a switch which controls movement of said particles from said

5 particle retaining reservoir to said channel, and

said switch has a damming portion which dams up said particles in said particle retaining reservoir, and a trigger channel which is communicated with said channel at said damming portion or downstream side thereof, and which
10 introduces said particles to said damming portion.

42. The chip according to claim 40 or 41,

wherein said analysis unit has a channel for analysis which is communicated with said separation unit, and a window unit which is provided above said channel for
5 analysis of said substrate, and through which a condensated state of said particles is sensed.